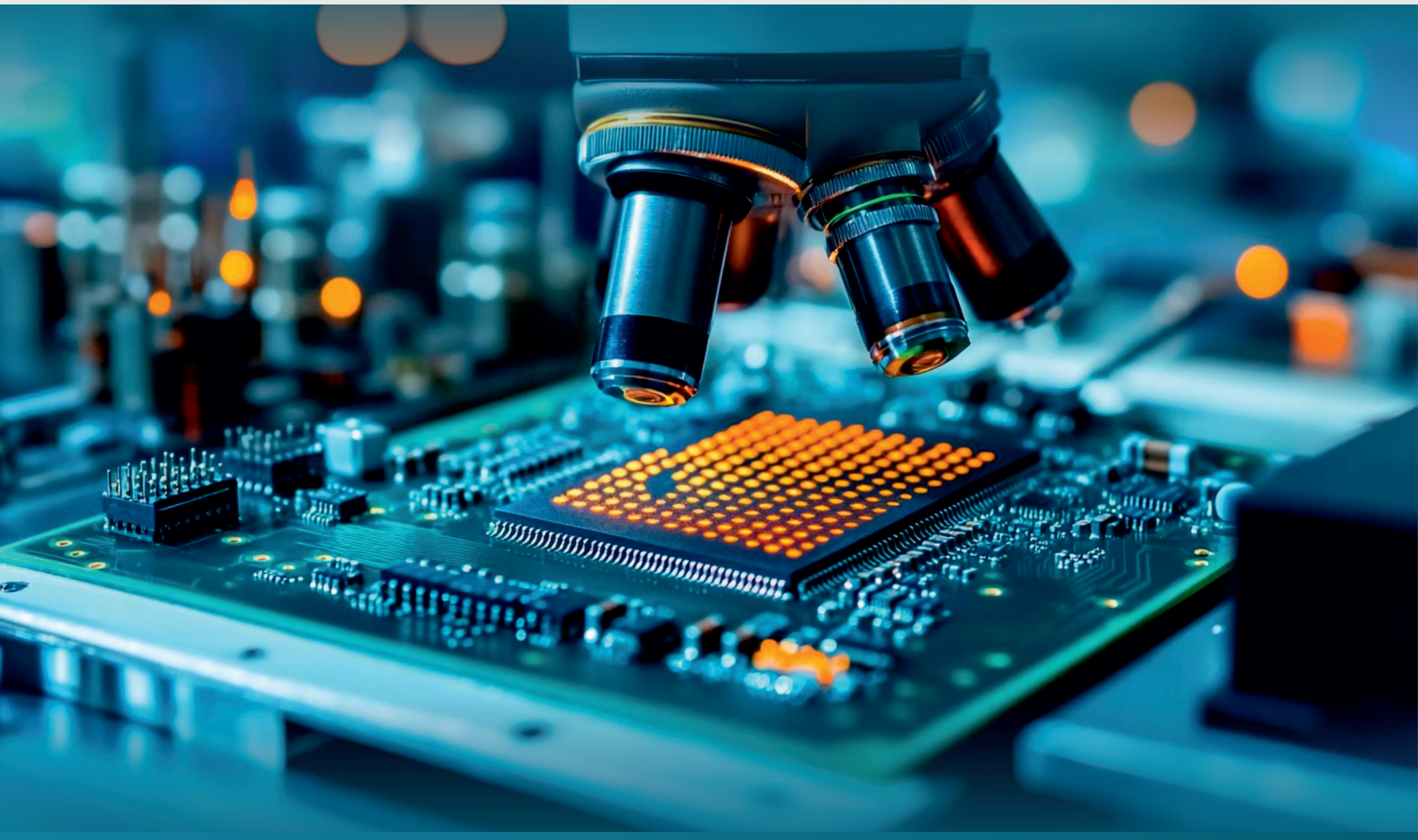
GALGOTIAS UNIVERSITY

GALGOTIAS SEMICONDUCTOR RESEARCH LAB

Department of Electrical, Electronics and Communication Engineering



Advancing India's Semiconductor Future Through Research, Innovation & Collaboration

ABOUT GALGOTIAS UNIVERSITY

Galgotias University is one of India's leading multidisciplinary universities recognised for academic excellence, research, innovation, global collaborations, and industry aligned education. With a vibrant student community of over 50,000 learners and a global alumni network of more than 100,000 graduates, the University has built a rapidly growing ecosystem focused on technology, entrepreneurship, interdisciplinary learning, and real-world impact.

In the QS World University Rankings 2027 by Quacquarelli Symonds, Galgotias University was placed in the 1201-1400 global band and ranked 16th among private universities and 46th among all universities in India. In the Times Higher Education World University Rankings 2026, the University was placed in the 1201-1500 global band and ranked 27th among private universities and 65th among all universities in India. The University is also accredited with NAAC A+, one of India's highest institutional quality ratings.

Galgotias University offers programmes across engineering, artificial intelligence, computer science, semiconductors, business, law, media, design, health sciences, hospitality, liberal education, and emerging interdisciplinary domains. In 2026, students secured more than 5,500 job offers from over 1,250 recruiters. The University has built strong industry and innovation partnerships with organisations including Apple, Infosys, Intel, Cisco, Tata Technologies, L&T EduTech, Capgemini, and Salesforce, while continuing to strengthen its global academic engagement and startup ecosystem

VISION, MISSION AND OBJECTIVES

Vision

To become a globally recognized center of excellence in semiconductor research, education, and innovation.

Mission

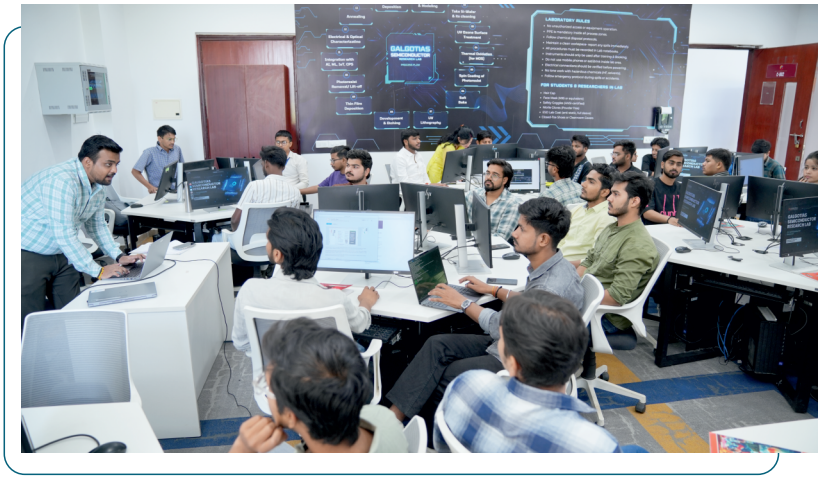
To advance semiconductor research and innovation that contributes to national development, industry excellence, and societal well-being.

Objectives

- Advance semiconductor research and IP creation
- Promote industry-academia collaboration
- Develop future-ready semiconductor talent
- Support Atmanirbhar Bharat and India Semiconductor Mission

INDIA SEMICONDUCTOR MISSION

The India Semiconductor Mission (ISM) aims to build a strong semiconductor and display ecosystem, positioning India as a global hub for electronics manufacturing and design, while serving as the nodal agency for the efficient and seamless implementation of semiconductor and display schemes*.



OVERVIEW

Galgotias University Semiconductor Research Lab (GSRL) is a cutting-edge research and innovation center dedicated to semiconductor technologies, VLSI design, AI-driven semiconductor systems, device simulation, packaging technologies, and industry-oriented research. The initiative aligns with India's Semiconductor Mission, National Quantum Mission, and Skill India programs.

RESEARCH CURRICULUM STRUCTURE

STAGE 1:
Foundation & Orientation

- Semiconductor Fundamentals
- Device Physics & Materials
- VLSI Design Flow Overview
- EDA Tools Orientation
- Research Methodology

STAGE 2:
Core Learning & Tools

- SVLSI Design & Simulation
- Analog & Digital IC Design
- Physical Design & Verification
- TCAD / Device Simulation
- Python & TCL Scripting

STAGE 3:
Research & Applications

- Advanced IC Design Projects
- AI/ML for Semiconductor Applications
- IoT & Edge Semiconductor Systems
- Packaging & Testing Technologies
- Industry Case Studies

STAGE 4:
Innovation & Impact

- Research Publications
- IPR & Patent Filing
- Prototype Development
- Industry Collaboration
- Technology Transfer & Startups

MoU Signing Ceremony with the VLSI Society of India (VSI)

Core Learning Sessions conducted by the National Institute of Electronics and Information Technology (NIELIT)

Distinguished academicians during their visit to GSRL Lab.

Certificate Distribution Ceremony following the successful completion of the VLSI workshop

RESEARCH INFRASTRUCTURE & FACILITIES

- VLSI Design & Verification Lab with licensed EDA tools
- High Performance Computing (HPC) infrastructure for simulation and AI/ML workloads
- Advanced semiconductor research classrooms and collaborative research spaces
- Device simulation and packaging support environment

EDA & SIMULATION TOOLS

cadence | SYNOPSYS | MATLAB | Ansys LUMERICAL | COMSOL

INDUSTRY AND ACADEMIA PARTNERS

Company	Collaboration	MoU Status (Active / Proposed)	Proposed Activities
VLSI Society of India	Industry	Active	Curriculum, Trainings
Entuple	Industry	Active	Trainings of faculty and students
Electronics & ICT Academy	Academia	Active	Trainings of faculty and students
ARK Infosolution Pvt Ltd.	Industry	Active	Trainings of faculty and students
Eduskills	Academia	Active	Internships
NIELIT, Noida	Academia	Active	Bootcamps/trainings for students

CAREER OPPORTUNITIES

- Chip Design Engineer
- Verification Engineer
- Applications Engineer
- Research Scientist
- AI/ML Semiconductor Engineer
- Embedded Systems Engineer
- Product Development Engineer
- Process and Device Engineer

STUDENT RESEARCH PROJECTS & ACHIEVEMENTS

Students of the Galgotias Semiconductor Research Lab (GSRL) are actively involved in advanced semiconductor and AI-driven hardware research projects.

- Aditya Singh, B.Tech(ECE)-3rd Year is working on an Analog Multiplier with AI Accelerator, focusing on intelligent high-speed analog computation techniques.
- Prakhar Dikshit, B.Tech(ECE)-3rd Year is exploring In-Memory Computing with AI, aiming to enhance computational efficiency by integrating memory and processing architectures.
- Ashish Raj, B.Tech(ECE)-3rd Year is developing an Analog Vector Dot Product Engine for AI and signal-processing applications.
- Vedant Rajgaria, B.Tech(ECE)-3rd Year is working on an AI-Inspired Winner Take All Circuit and has demonstrated innovative approaches toward neuromorphic and intelligent hardware systems.

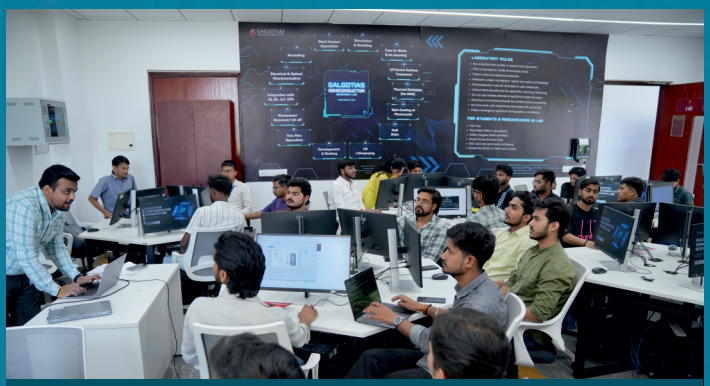
These projects reflect the strong research culture, hands-on learning environment, and innovation-driven ecosystem established at GSRL for future semiconductor engineers and researchers.

STUDENT TESTIMONIAL

“Being a part of the Galgotias Semiconductor Research Lab (GSRL) has been a highly enriching experience for me. The lab provides excellent opportunities to work on advanced semiconductor technologies, VLSI design, and industry-oriented research projects. The practical learning environment, access to modern EDA tools, and continuous guidance from faculty mentors have helped me improve my technical skills and research mindset significantly. GSRL truly inspires students to innovate and contribute to the future of semiconductor technology in India.”- Vedant (B. Tech. 3rd Year, ECE core)

5-Days Training Program on “VLSI Circuit Designing using CADENCE”.

Visit of Dr Satya Gupta President VLSI Society of India for Semiconductor and VLSI Technology.



5-Days Bootcamp on "RTL, IP and SoC Signoff" Conducted by NIELIT”.

Award Ceremony for the Workshop on “Photonics & Electromagnetics using Ansys Lumerical and HFSS".

STUDENT RESULTS & SNAPSHOTS

Students at GSRL work on industry-relevant projects using advanced EDA tools.
Below are a few snapshots of their work and results.

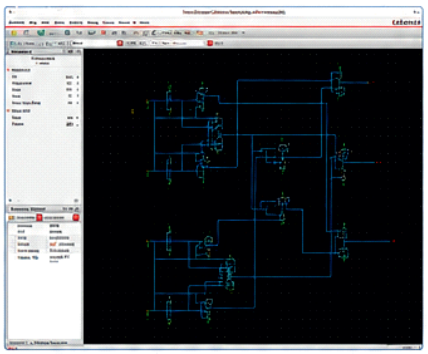
PROJECT 1 — 4-BIT CMOS ALU DESIGN

Tools Used: Cadence Virtuoso, Xschem

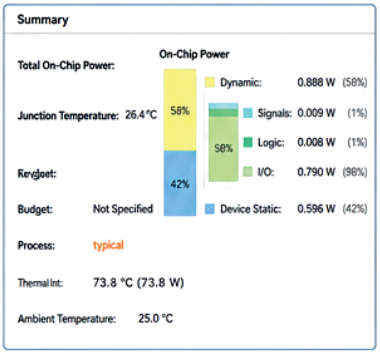
Description: Designed and simulated a 4-bit Arithmetic Logic Unit using CMOS logic.

Key Results:

- Functional verification successful
- Power optimized design
- Total Power: 1.404 W
- Junction Temperature: 26.4 °C



Schematic Snapshot (Cadence Virtuoso)



Power Analysis Summary

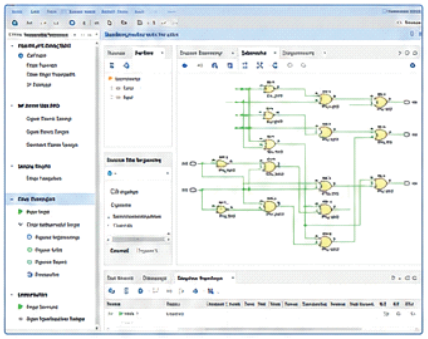
PROJECT 2 — COMPARATOR DESIGN

Tools Used: Vivado, Xilinx

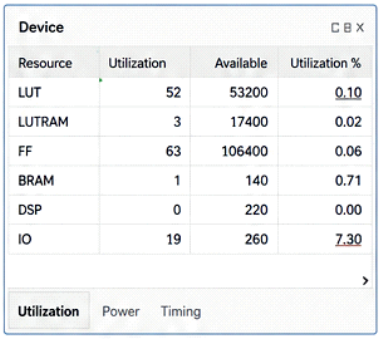
Description: Designed and implemented a 4-bit magnitude comparator on FPGA.

Key Results:

- RTL design and simulation successful
- Synthesized without critical warnings
- Implemented on FPGA Board
- Power efficient and area optimized



RTL Schematic (Vivado)



Resource	Utilization	Available	Utilization %
LUT	52	53200	0.10
LUTRAM	3	17400	0.02
FF	63	106400	0.06
BRAM	1	140	0.71
DSP	0	220	0.00
IO	19	260	7.30

Utilization | Power | Timing

FPGA Utilization Summary

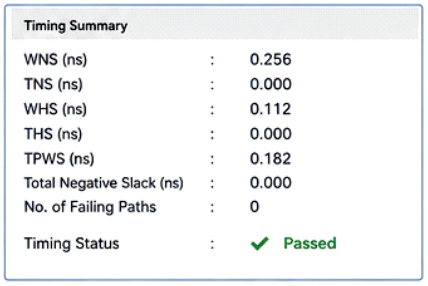
PROJECT 3 — LOW POWER CMOS DESIGN

Tools Used: Cadence Genus, Innovus, Voltus

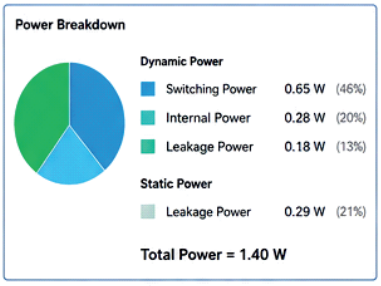
Description: Designed a low power digital block and performed full flow analysis.

Key Results:

- Low Power Design Techniques Applied
- Power reduced by 28%
- Timing met for all corners
- Tapeout ready design


Timing Summary
WNS (ns) : 0.256
TNS (ns) : 0.000
WHS (ns) : 0.112
THS (ns) : 0.000
TPWS (ns) : 0.182
Total Negative Slack (ns) : 0.000
No. of Failing Paths : 0
Timing Status : Passed

Timing Summary (Post-Layout)



Power Breakdown Report

STUDENT RESEARCH PROJECTS & ACHIEVEMENTS

Students are actively engaged in cutting-edge semiconductor and AI-driven hardware research projects.

Student Name	Roll No.	Contact No.	Project Title	Section
Aditya Singh	23SECE1030134	9631156679	Analog multiplier with AI accelerator	Sec 2 ECE
Prakhar Dikshit	23SECE1030128	9129237961	Inmemory computing with AI	Sec 2 ECE
Ashish Raj	23SECE1030133	9852077555	Analog vector dot product engine	Sec 2 ECE
Rahul	23SECE1030098	9572724375	AI inspire winner take all circuit	Sec 2 ECE

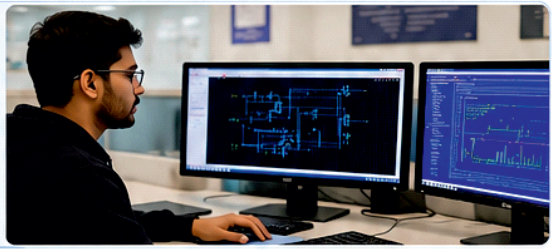
These projects demonstrate the students' strong conceptual understanding, hands-on skills, and innovative approach towards solving real-world challenges in AI and semiconductor design.

STUDENT TESTIMONIAL

"GSRL has provided me with exceptional hands-on experience in semiconductor design and research. Working on real-world projects using industry-standard EDA tools has strengthened my technical skills and confidence. The guidance from mentors and collaborative environment inspires us to innovate and contribute to India's semiconductor future."

– Rahul

B.Tech, ECE | GSRL Research Member



At GSRL, we turn ideas into innovations and empower students to be future leaders in semiconductor research and design.

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